Activity Title: Modeling the Gulf Ecosystem

Subject (Focus/Topic): This lesson introduces students to some of the different species that inhabit the Gulf of Mexico and how they are connected in a food web.

Grade Level: 6th grade

Average Learning Time: Three 60 minute lessons, plus possible additional research time

Lesson Summary (Overview/Purpose): In this lesson, students will use resources necessary to conduct research and create accurate models in science

Overall Concept (Big Idea/Essential Question): What are models in science?

Specific Concepts (Key Concepts):

- Conduct research on an unknown topic
- Create a scale model to show accurate scaled dimensions of an animal

Focus Questions (Specific Questions):

- What are some critters that are found in the ocean, specifically the Gulf of Mexico?
- Why is it important to count and record data about the size, weight, distribution and location of various Gulf critters?
- What are the main predators of each critter?
- What are main sources of food for each critter?

Objectives/Learning Goals:

By the end of the lesson, students will be able to:

1. SWBAT identify the main characteristics of their critter (including its prey and what predators it has) by conducting research using materials and websites provided
2. Using their research information, SWBAT create an accurate scale model of the critter they research, scoring a minimum of 12/15 on the rubric provided.

Background Information:

- Students need a general understanding about various marine ecosystems and the different marine environments certain organisms can be found in

Materials:

*Materials for a class of 30

- 30 Critter cards (cards with pictures and research websites) – can have repeats of the same critters

- A variety of materials for building (i.e., markers, crayons, colored pencils, paper, paper towel tubes, clay, other recyclable materials)- can be student provided as well
- Paper
- Rulers/meter sticks
- Laptop computers
- Camera (for documentation)- optional

Technical Requirements:

- Computers with internet access for student research

Teacher Preparation:

Teacher will need to prepare the critter cards with pictures and informational websites for each critter. Also, teacher may collect recyclable materials for building of the model

Keywords: ecosystem, data, scale model

Pre-assessment Strategy/Anticipatory Set (Optional):

Show students real pictures of critters found in the Gulf of Mexico from TAS blog to activate interest. (http://teacheratsea.wordpress.com/category/andrea-schmuttermair/)

Lesson Procedure:

1. Begin the lesson with background information about the Gulf of Mexico. Review with students the location of the Gulf, and show pictures of some of the animals that may be found living in the Gulf.
2. As a class, fill out the "K" of a KWL chart. What do you know about the Gulf of Mexico?
3. As a class, fill out the "W"- what are you wondering about or curious about regarding to the ecosystem of the Gulf of Mexico.
4. Students "fish" for their critter picture, which will have the information they will need to research their fish.
5. Over the next week, guide students in their research using the websites provided and any additional resources they can find to learn about their critter
6. Using the information gathered, students create a model of their critter that meets the guidelines specified (see Appendix A).
7. Form students into groups. In the groups, students are to report on their critter they researched giving information specified in their research document. (Appendix B), using their model as a visual. After a student is done presenting, the other students will write down what they learned about each critter in their science notebooks.

Assessment and Evaluation:

1. Students organize critters into food chains (add in plankton and other critters on the lower end of the food chain) and explain why they organized their critters this way using the information they learned when researching their animal.

2. Next, have students discuss these extension questions:
    a. What would happen if the predator was removed from the chain?
    b. What if one of the middle critters were to be removed, or their populations greatly decreased/increased?

Standards:

National Science Education Standard(s) Addressed:

A: Science as Inquiry: 1c, 1d, 1h, 2d
C Life Science: 4a, 4b, 5a

Ocean Literacy Principles Addressed:

5. The ocean supports a great diversity of life and ecosystems.
d Ocean biology provides many unique examples of life cycles, adaptations and important relationships among organisms (symbiosis, predator-prey dynamics and energy transfer) that do not occur on land.

State Science Standard(s) Addressed:

Prepared Graduates:
Analyze how various organisms grow, develop, and differentiate during their lifetimes based on an interplay between genetics and their environment

1. All living things share similar characteristics, but they also have differences that can be described and classified

b. Use evidence to develop a scientific explanation for similarities and/or differences among different organisms (species)

d. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate questions about characteristics of living things

Additional Resources:

1. Andrea Schmuttermair's Teacher at Sea blog: http://teacheratsea.wordpress.com/category/andrea-schmuttermair/
2. Identification Guide to Marine Organisms of Texas: http://txmarspecies.tamug.edu/
3. Ichthyology at the Florida Museum of Natural History: http://www.flmnh.ufl.edu/fish/
4. Atlantic sharpnose shark: http://www.flmnh.ufl.edu/fish/Gallery/Descript/AtlanticSharpnoseShark/AtlSharpnose.html
5. Blue crab: http://www.sms.si.edu/irlspec/callin_sapidu.htm
6. Shrimp: http://www.sms.si.edu/irlspec/penaeu_aztecu.htm; http://www.fishwatch.gov/seafood_profiles/species/shrimp/species_pages/brown_shrimp.htm
7. American croaker: http://www.tpwd.state.tx.us/huntwild/wild/species/croaker/

8. Cownose ray: http://www.chesapeakebay.net/fieldguide/critter/cownose_ray
9. Octopus: http://animals.nationalgeographic.com/animals/invertebrates/common-octopus/
10. Red snapper: http://www.flmnh.ufl.edu/fish/Gallery/Descript/RedSnapper/Redsnapper.html
11. Mantis shrimp: http://www.ucmp.berkeley.edu/arthropoda/crustacea/malacostraca/eumalacostraca/royslist/species.php?name=s_empusa
12. Roundel Skate: http://www.flmnh.ufl.edu/fish/Gallery/Descript/roundelskate/roundelskate.html
13. Atlantic flying fish: http://animals.nationalgeographic.com/animals/fish/flying-fish/
14. Atlantic sharpnose shark: http://www.flmnh.ufl.edu/fish/Gallery/Descript/AtlanticSharpnoseShark/AtlSharpnose.html
15. Butterfish: http://www.gma.org/fogm/poronotus_triacanthus.htm

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Creation date: November 1, 2012

Appendix A

Creating a Scale Model

Guidelines for critter research:

You will be creating a model of your critter using recyclable materials provided in the classroom and/or at home. Your model will be a scale model, and can be of a smaller OR larger scale as compared to the original. Please attach a paper showing your conversions for your critter's length, width, height and weight.

Before beginning your model, you need to research your critter using the website links provided to you on your critter card.

Use the research paper to help you gather important information you will need to create your model.

You will be bringing your model to class on _____ and presenting it to your classmates. Please be prepared to report on key information about your critter from your research paper.

Rubric for Critter model:

	1- Unsatisfactory	2- Satisfactory	3- Proficient	4 - Advanced
Dimensions	More than one of the following may be inaccurate: length, width, height	One of the following may be inaccurate: length, width, height	Correct length, width and height (within found range)	Realistic length, width, height and weight
Colors	Color scheme is unrealistic and/or incorrect for the species	May be missing some key colors	Basic colors; includes proper color scheme and patterns	Realistic blend of colors used;
Distinguishing features	Missing any evidence of distinguishing features	Few distinguishing features can be seen	Some distinguishing features can be seen	Inclusion of many distinguishing features in a detailed fashion
Neatness and creativity	The model looks thrown together at the last minute. It appears that little design or planning was done. Craftsmanship is poor.	The design and construction were planned. The item has several flaws (unwanted bumps, marks, or tears), that detract from the overall look.	The model shows that the creator took pride in his/her work. The design and construction look planned. The item has a few flaws (unwanted bumps, marks, or tears), but these do not detract from the overall look.	The model shows that the creator was took great pride in his/her work. The design and construction look carefully planned. The item is neat (free of unwanted marks and tears).
Critter research paper	Incomplete/missing a significant amount of information	Incomplete/missing some information	Completed with some detailed information	Completed with detailed information

Appendix B

Critter Research Page

Critter:

Range for:

Length

Width

Height

Weight

Location which I can be found:

Location which I was found (choose a location in the range you provided above):

Color(s):

Distinguishing features:

What do I eat?

What eats me?

3+ interesting facts about me:

Critters of the Gulf of Mexico

hermit crab

Octopus

flamed box crab

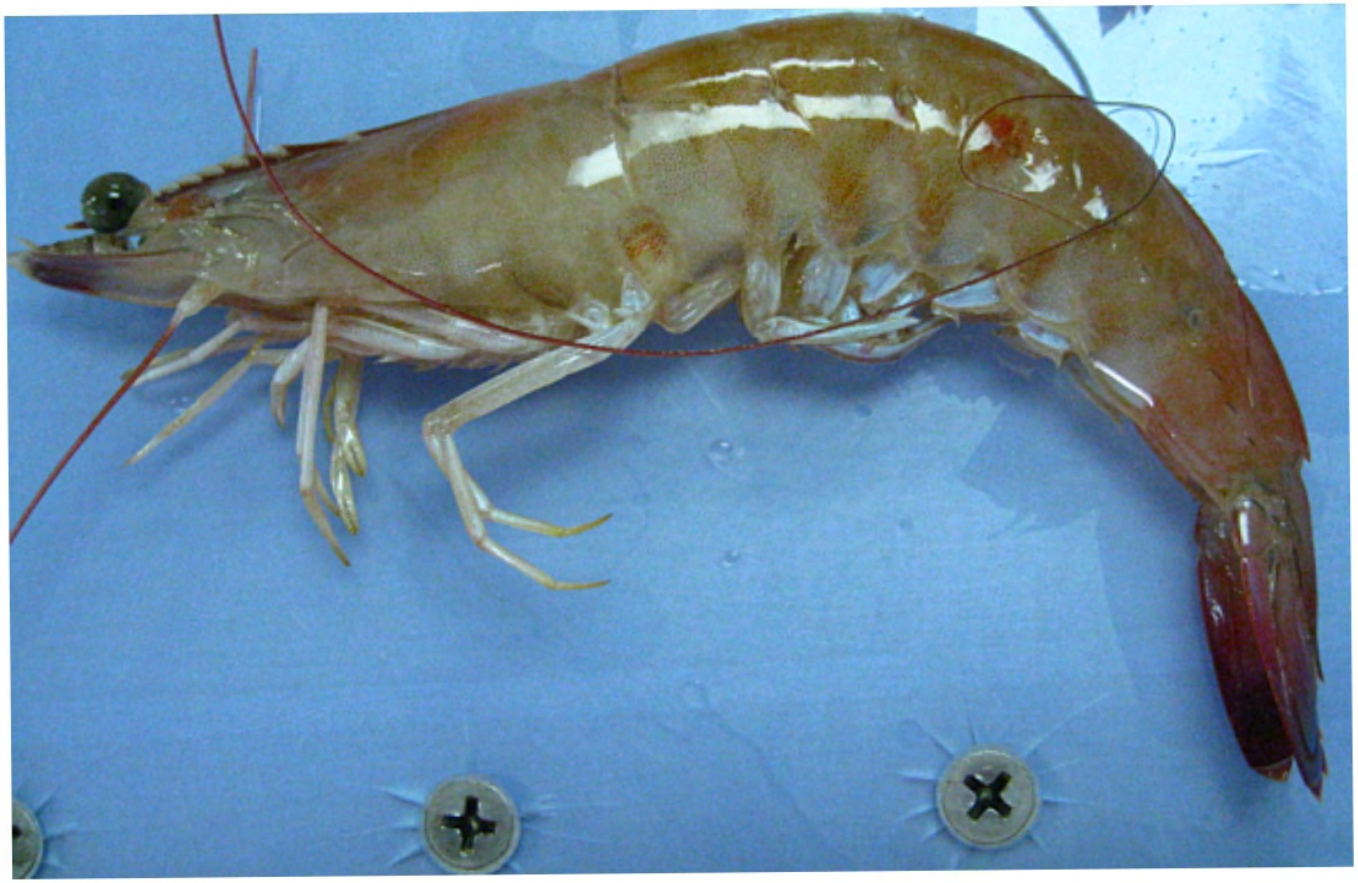
Red snapper

Blue crab

Mantis shrimp

pink shrimp

brown shrimp



white shrimp

Roundel skate

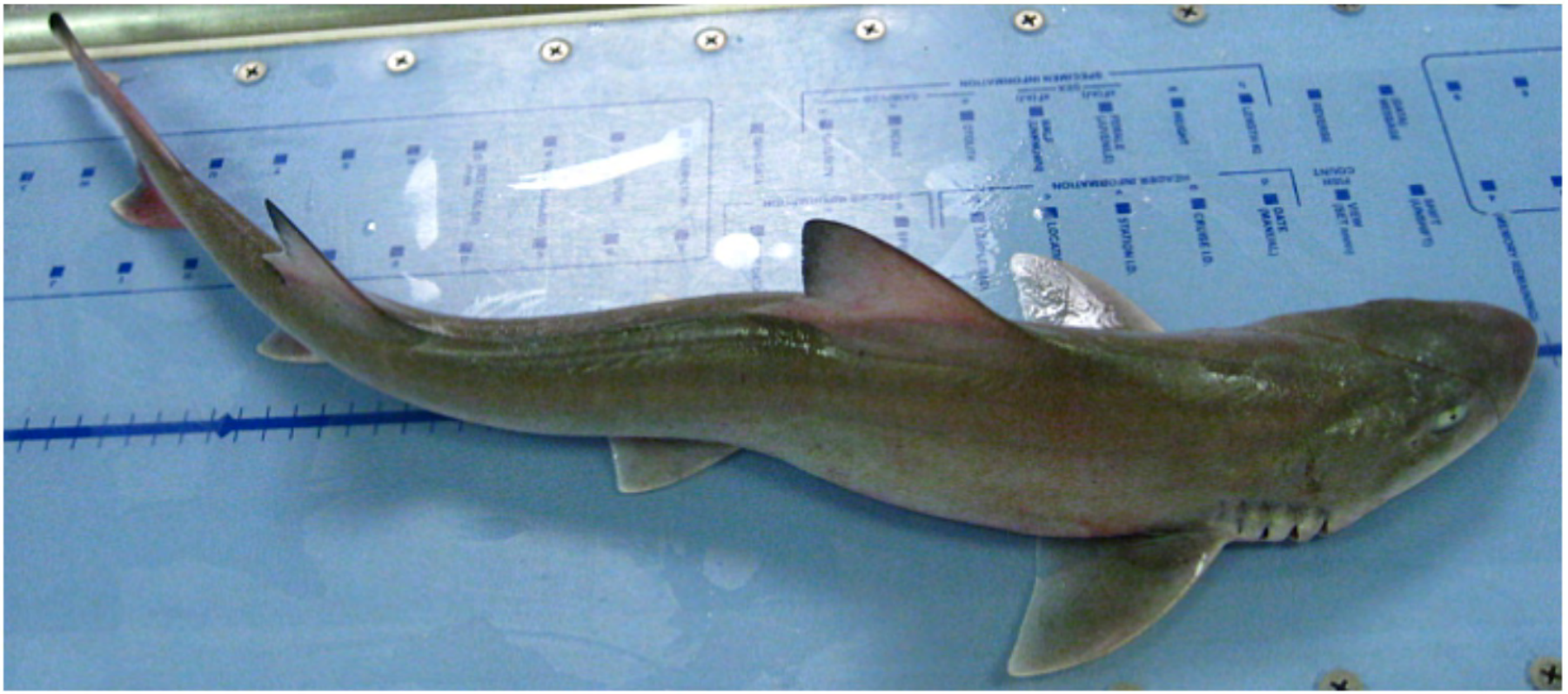
squid

Big eye searobin

Atlantic croaker

Atlantic flying fish

Atlantic sharpnose shark



Gulf butterfish

Moonfish

Fringed flounder

sea worm

Cownose ray

Websites to research

1. Andrea Schmuttermair's Teacher at Sea blog: http://teacheratsea.wordpress.com/category/andrea-schmuttermair/
2. Identification Guide to Marine Organisms of Texas: http://txmarspecies.tamug.edu/
3. Atlantic sharpnose shark: http://www.flmnh.ufl.edu/fish/Gallery/Descript/AtlanticSharpnoseShark/AtlSharpnose.html
4. Blue crab: http://www.sms.si.edu/irlspec/callin_sapidu.htm
5. Shrimp: http://www.sms.si.edu/irlspec/penaeu_aztecu.htm; http://www.fishwatch.gov/seafood_profiles/species/shrimp/species_pages/brown_shrimp.htm
6. American croaker: http://www.tpwd.state.tx.us/huntwild/wild/species/croaker/
7. Cownose ray: http://www.chesapeakebay.net/fieldguide/critter/cownose_ray
8. Octopus: http://animals.nationalgeographic.com/animals/invertebrates/common-octopus/
9. Red snapper: http://www.flmnh.ufl.edu/fish/Gallery/Descript/RedSnapper/Redsnapper.html
10. Mantis shrimp: http://www.ucmp.berkeley.edu/arthropoda/crustacea/malacostraca/eumalacostraca/royslist/species.php?name=s_empusa
11. Roundel Skate: http://www.flmnh.ufl.edu/fish/Gallery/Descript/roundelskate/roundelskate.html
12. Atlantic flying fish: http://animals.nationalgeographic.com/animals/fish/flying-fish/
13. Atlantic sharpnose shark: http://www.flmnh.ufl.edu/fish/Gallery/Descript/AtlanticSharpnoseShark/AtlSharpnose.html
14. Butterfish: http://www.gma.org/fogm/poronotus_triacanthus.htm